

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
27 June 2002 (27.06.2002)

PCT

(10) International Publication Number
WO 02/050933 A3

(51) International Patent Classification⁷: H01M 4/02, 2/16

(21) International Application Number: PCT/US01/49170

(22) International Filing Date:
18 December 2001 (18.12.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/258,105 21 December 2000 (21.12.2000) US

(63) Related by continuation (CON) or continuation-in-part (CIP) to earlier application:
US 60/258,105 (CON)
Filed on 21 December 2000 (21.12.2000)

(71) Applicant (*for all designated States except US*):
MOLTECH CORPORATION [US/US]; 9062 South Rita Road, Tucson, AZ 85747-9108 (US).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **MIKHAYLIK, Yuriy, V.** [UA/US]; 5855 North Kolb Road #9208, Tucson, AZ 85750 (US). **SHEEHAN, Christopher, J.** [US/US]; 551 East Roger Road, Tucson, AZ 85705 (US). **SKOTHEIM, Terje, A.** [NO/US]; 7080 North Cathedral Rock Place, Tucson, AZ 85718 (US).

(74) Agent: **NICOL, Jacqueline, M.**; Moltech Corporation, Intellectual Property Department, 9062 South Rita Road, Tucson, AZ 85747-9108 (US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

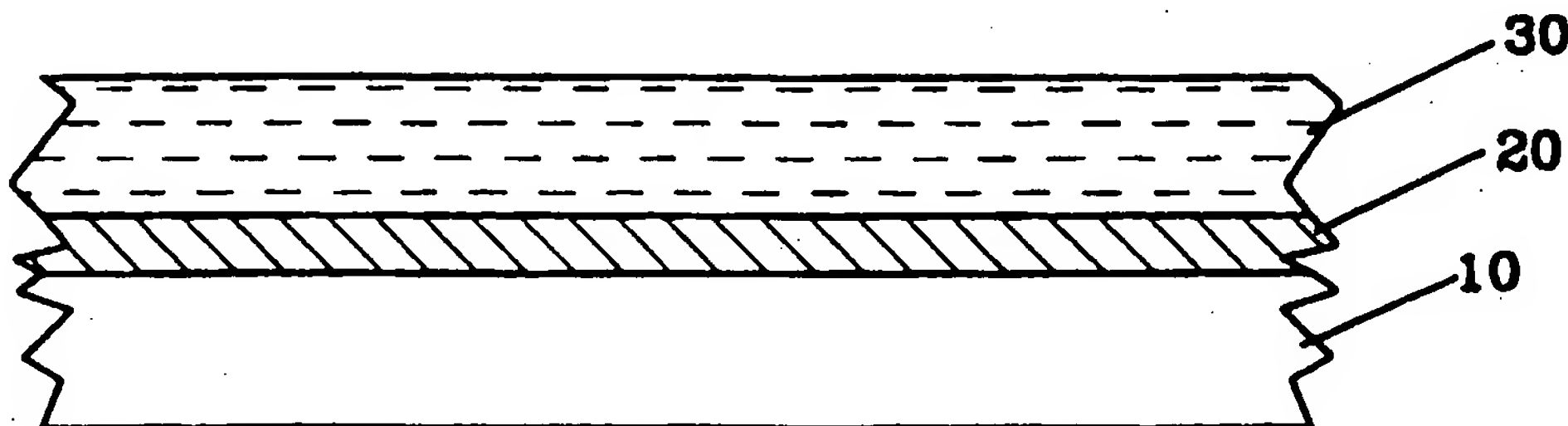
Published:

— with international search report

(88) Date of publication of the international search report:
17 April 2003

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LITHIUM ANODES FOR ELECTROCHEMICAL CELLS



(57) Abstract: Provided are anodes for use in electrochemical cells, wherein the anode comprises an anode active layer comprising lithium and a polymer anode substrate comprising a polymer film layer and a protective crosslinked polymer layer, in which the protective crosslinked polymer layer is in contact with the anode active layer on the side opposite to the surface in contact with the polymer film layer. The present invention also pertains to methods for forming such anodes and electrochemical cells comprising such anodes. The polymer film layer may be a terephthalate, a naphthalate, or an isophthalate, i.e. a polyester film. The protective crosslinked polymer layer may consist of acrylate polymer.

WO 02/050933 A3

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 01/49170

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H01M4/02 H01M2/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 478 676 A (TURI ERAN ET AL) 26 December 1995 (1995-12-26) abstract; figures 2,3 column 2, line 10 - line 17 column 3, line 7 -column 4, line 6 column 4, line 44 - line 45; examples 12,14	12-14, 22,23
Y	---	1-3,6,9
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

*** Special categories of cited documents:**

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

2 September 2002

Date of mailing of the international search report

16/09/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Hintermaier, F

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/49170

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 615 961 A (PARK GEORGE B ET AL) 7 October 1986 (1986-10-07) abstract column 2, line 50 - column 3, line 27 column 4, line 21 - line 32 column 6, line 30 - line 55 column 8, line 11 - line 15 column 10, line 4 - line 8	12, 15, 19, 20, 22, 23
Y	---	1, 6-9
X	US 5 066 554 A (HOPE HENRY F ET AL) 19 November 1991 (1991-11-19) abstract; figure 3 column 2, line 14 - line 49	12, 20, 22, 23
Y	---	1, 6-9
Y	US 5 395 644 A (AFFINITO JOHN D) 7 March 1995 (1995-03-07) column 2, line 25 - line 27 column 3, line 49 - column 4, line 32 column 5, line 10 - line 37	1-3, 6-9
A	---	
	US 6 277 514 B1 (YING QICONG ET AL) 21 August 2001 (2001-08-21) the whole document -----	22

INTERNATION SEARCH REPORT

formation on patent family members

ional Application No

PCT/US 01/49170

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5478676	A	26-12-1995	EP 0782771 A1 JP 11505660 T WO 9604689 A1	09-07-1997 21-05-1999 15-02-1996
US 4615961	A	07-10-1986	AT 60464 T AU 573637 B2 AU 3496184 A CA 1244876 A1 DE 3484011 D1 EP 0146246 A1 GB 2149565 A , B IL 73398 A IN 163202 A1 JP 60115156 A ZA 8408594 D	15-02-1991 16-06-1988 09-05-1985 15-11-1988 28-02-1991 26-06-1985 12-06-1985 20-10-1987 20-08-1988 21-06-1985 30-07-1986
US 5066554	A	19-11-1991	NONE	
US 5395644	A	07-03-1995	US 5260095 A US 5547508 A AT 170779 T CA 2142895 A1 DE 69320971 D1 DE 69320971 T2 DK 655954 T3 EP 0655954 A1 JP 8503099 T WO 9404285 A1	09-11-1993 20-08-1996 15-09-1998 03-03-1994 15-10-1998 27-05-1999 07-06-1999 07-06-1995 02-04-1996 03-03-1994
US 6277514	B1	21-08-2001	US 6183901 B1 US 6194098 B1 AU 2196000 A AU 2368100 A CN 1334969 T CN 1334970 T EP 1151486 A1 EP 1149425 A1 WO 0036670 A1 WO 0036671 A1 US 2001053475 A1 US 2001000485 A1 US 6410182 B1	06-02-2001 27-02-2001 03-07-2000 03-07-2000 06-02-2002 06-02-2002 07-11-2001 31-10-2001 22-06-2000 22-06-2000 20-12-2001 26-04-2001 25-06-2002